

## CLAIMS

What is claimed is:

1. A method for monitoring an aircraft accessory comprising the steps of:
  - sensing baseline parametric data during operation of the aircraft accessory during an acceptance test procedure;
  - storing said sensed baseline parametric data;
  - sensing real-time operational parametric data;
  - comparing the sensed real-time operational parametric data with the stored baseline parametric data; and
  - determining at least one relationship between the sensed real-time operational parametric data and the stored baseline parametric data.
2. The method of claim 1, further comprising the step of storing a bill of materials for the aircraft accessory.
3. The method of claim 2, further comprising the step of associating the at least one relationship between the sensed operational parametric data and the stored baseline parametric data with at least one entry in the bill of materials.
4. The method of claim 2, further comprising the step of determining logistical requirements for the aircraft accessory based at least in part on the at least one relationship of the sensed operational parametric data to the stored baseline parametric data.
5. The method of claim 1, further comprising the step of storing the sensed real-time operational parametric data.
6. The method of claim 5, further comprising the step of downloading the stored real-time operational parametric data and the stored baseline parametric data to an external processor for off-line analysis.

7. The method of claim 1, further comprising the step of determining maintenance requirements for the aircraft accessory based at least in part on the at least one relationship between the sensed operational parametric data and the stored baseline parametric data.
8. The method of claim 1, further comprising the step of reporting data relating to the at least one relationship of the sensed operational parametric data to the stored baseline parametric data.
9. The method of claim 8, wherein the step of reporting data relating to the at least one relationship comprises the step of reporting data relating to a real-time deviation of sensed real-time parametric data from the stored baseline parametric data exceeding a pre-determined tolerance.
10. The method of claim 8, further comprising the step of isolating a fault based at least in part on the at least one relationship of the operational parametric data to the baseline parametric data.
11. The method of claim 1, further comprising the steps of:
  - developing one or more parametric models of the aircraft accessory;
  - determining at least one relationship between sensed real-time operational parametric data and each parametric model.
12. The method of claim 11, wherein one of the parametric models is a six-sigma parametric model of said aircraft accessory.
13. The method of claim 11, further comprising the step of downloading said parametric model and said recorded real-time operational parametric data for off-line analysis.
14. The method of claim 11, further comprising the step of determining at least one relationship of the real-time operational parametric data to each parametric model.

15. The method of claim 14, further comprising the step of displaying data relating to a relationship of the sensed real-time operational parametric data to each parametric model.
16. The method of claim 15, wherein the step of displaying data relating to a relationship of the sensed real-time operational parametric data to each parametric model comprises displaying data relating to real-time deviations of the sensed real-time operational parametric data from the parametric model exceeding a pre-determined tolerance.
17. The method of claim 11, further comprising the step of determining maintenance requirements for the aircraft accessory based at least in part on the at least one relationship of sensed real-time operational parametric data to each parametric model.
18. The method of claim 17, further comprising the step of associating the at least one relationship between the sensed real-time operational parametric data and the parametric model with at least one entry in a bill of materials.
19. The method of claim 17, wherein the step of determining maintenance requirements further comprises determining at least one relationship of the sensed real-time operational parametric data with the baseline parametric data.
20. The method of claim 11, further comprising the step of determining logistical requirements for the aircraft accessory based at least in part on the at least one relationship of the sensed real-time operational parametric data to the model parametric data.
21. The method of claim 20, further comprising the step of associating the at least one relationship between the sensed real-time operational parametric data and the parametric model with at least one entry in the bill of materials.
22. The method of claim 20, wherein the step of determining logistical requirements further comprises determining at least one relationship between the sensed real-time operational data with the baseline parametric data.

23. An apparatus for monitoring an aircraft accessory, comprising
- memory having stored therein at least baseline parametric data that was obtained during an acceptance test procedure;
- a sensor configured to sense a physical parameter associated with the aircraft accessory and operable to supply a sensor signal representative thereof;
- a processor coupled to receive the sensor signal and in operable communication with the memory, the processor configured to (i) selectively retrieve the baseline parametric data from the memory, (ii) produce operational parametric data from the sensor signal, and (iii) compare the operational parametric data with the baseline parametric data, to thereby determine a relationship there between.
24. The apparatus of claim 23, further comprising software residing in the memory and executable on the processor to determine relationships between the operational parametric data and the baseline parametric data in real-time.
25. The apparatus of claim 23, further comprising model parametric data residing in the memory, said parametric model relating to the aircraft accessory.
26. The apparatus of claim 25, wherein the parametric model comprises parametric data for a six-sigma model of the aircraft accessory.
27. The apparatus of claim 25, further comprising software residing in the memory and executable on the processor to determine at least one relationship between real-time operational parametric data and the parametric model.
28. The apparatus of claim 27, further comprising software residing in the memory executable on the processor to analyze the real-time operational parametric data, the parametric model, and the baseline parametric data to determine maintenance requirements relating to the aircraft accessory.

29. The apparatus of claim 27, further comprising software residing in the memory executable to analyze the real-time operational parametric data, the parametric model, and the baseline parametric data to determine logistical requirements relating to the aircraft accessory.

30. The apparatus of claim 23, wherein said sensor is integral to said aircraft accessory.

31. The apparatus of claim 23, wherein said memory is integral to said aircraft accessory.

32. The apparatus of claim 23, wherein said apparatus for monitoring is integral to said aircraft accessory.

33. A method for reducing vehicle down-time comprising the steps of:

storing baseline parametric data gathered during acceptance testing of a component to be installed in the vehicle;

gathering real-time operational parametric data relating to the component;

analyzing relationships between the real-time operational parametric data and the baseline parametric data; and

performing preventive maintenance based on the analysis.

34. The method of claim 25, further comprising the steps of:

developing a parametric model relating to the component; and

analyzing relationships between the real-time operational parametric data and the parametric model.

35. The method of claim 34, further comprising the step of analyzing relationships between the real-time operational parametric data, the parametric model, and the baseline parametric data.